



Yield opportunity down the drain?

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from theory to field

It's one of the greatest assets in agriculture, but on many farms the grant-funded drainage scheme of the previous generation has been neglected for decades. CPM investigates.

By Tom Allen-Stevens

If you're a grower under the age of 50, there's a strong chance you have at some point experienced a tut-tutting from the older generation due to the lack of attention paid to the under-field drains and outfalls in your care.

If not, congratulations — you're probably one of the few growers looking after the legacy of grant-funded drains installed in the 1960s to 80s. But if you have neglected them, or if your conscience tugs away at you every time a wet patch appears in your fields, read on, because for the first time in a generation, help is at hand.

Not a priority

“There hasn't been much attention on drainage for the past 30 years,” notes Dr Paul Gosling of AHDB Cereals and Oilseeds. “The result is that a lot of drains are not maintained — it's not seen as a priority on farm, there's very little training in how to maintain them and it's barely even taught nowadays at agricultural colleges.”

But the wet autumn of 2012 brought drainage back into focus. “Until then, a series of relatively kind years allowed growers to get away with a minimum amount of drainage maintenance, or even none at all. But the problems growers faced that year exposed an endemic weakness the industry now suffers — the knowledge on drainage sits largely with those reaching or already past the retirement age.”

Since then, feedback at events and direct from farmers has identified drainage as a priority for funding. So AHDB has commissioned a project to bring the knowledge together (see panel on p51). “It's a cross-sector project, although the majority

of the funding has come from Cereals and Oilseeds because it's arable enterprises that will benefit most from improving drainage,” points out Paul Gosling.

The project has been part-funded by Catchment Sensitive Farming (CSF). “There's a concern that poor drainage leads to

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increased surface run-off and hence problems with pollution. What little current training and knowledge there is on drainage tends to focus on CSF activities," he explains.

But the outcome of the project — a practical guide that will be launched at Tillage Live in Sept — is focused on ensuring farmers achieve the maximum financial benefit from the drainage assets they have or install. "One of the main aspects we've struggled with, however, is finding accurate data on yield improvements over the past 30-40 years. We know the yield benefit can be considerable — once identified as a

There's a new practical guide that will be launched at Tillage Live in Sept.



problem, improving the drainage can be a no-brainer — but it's also a large capital outlay," he notes.

"With prices where they are, I can't see that many growers will rush to put new systems in. Issues with blackgrass, that can infest poorly drained land, may have focused minds, however, and one of the key aspects of the guide is the simple routine maintenance that can make a huge difference."

Follow-on projects

There aren't any plans at this stage for follow-on projects, he says. "There's no research call because, in terms of the drains themselves, the technology's not moved on since the 1980s, and the knowledge on drainage exists — it just needs to come together. There may be a call for workshops or events through the Monitor Farm network, but we'll see what the response is to the guide before assessing this."

With the project led by ADAS, it's been the job of soil and water engineer Kirk Hill to pull together the knowledge and experience on drainage. But although he has 20 years' experience in this area, he had to look further back for most of the authoritative information that's formed the substance of



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the guide. That included consulting research colleagues Robin Hodgkinson, who was involved in drainage research since the 1970s, and Dr Paul Newell Price.

"A lot of the research was done in the 1960s and '70s when there were grant-aided schemes. The practical information was scattered in various documents, and at the time it was disseminated to farmers in the form of on-farm leaflets. The information is there if you want it, but there's been precious little knowledge transfer on drainage for decades." ►

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It's common for an area of water-logging to be caused by a blocked outfall, that can take just a few minutes to remedy with a spade.

► There's been some new research, especially in terms of environmental impact, looking specifically at pollution and run-off. "Much of the research on subsoiling and its interaction with the soil was carried out in the 1980s. But there's very little evidence of any work on financial or long-term benefits of drainage. Then again, this isn't complex technology — gravity hasn't changed and nor has the way in which water flows through soil."

What may have changed since the days of the grant-aided schemes is the view of farmers towards their drains, however. Around 6.4M ha of agricultural land in England and Wales have been underdrained, he points out. "That's a huge asset farmers have under their feet, and many of them are neglecting it. There are financial implications of this, in terms of lost yield, but there's also the environmental cost, in terms of run-off."

How much does it cost?

Installing a new drainage system costs £2400-3500/ha with permeable backfill, or £1550-2250/ha without. "The backfill is a costly addition and quite a long-debated subject, but research suggests the performance of drains on clay soils soon slows up if it's left out," notes Kirk Hill.

Typically drains would be spaced 20-25m apart, although this can be as wide as 80m, resulting in a lower installation cost, if supplemented with mole drains.

Installation equipment hasn't changed much since the 1980s, he says. "Essentially it's like a giant chain saw on tracks. They have more sophisticated levelling equipment now and there's greater use of GPS."

While the payback is typically 7-10 years, a drainage system has a useful life of at least 20 years, and can last much longer with good maintenance. The benefits tend to be pretty

immediate, and these are more than just increased yield, notes Kirk Hill. Other upsides include:

- Better access to land, allowing a wider window for crop establishment that can benefit those drilling in late autumn or moving to spring crops.
- Improved speed of work and fuel usage, from better traction, lower draught forces and fewer cultivation passes needed.
- Benefits to soil structure and the environment, from less trafficking in wet conditions, fewer losses of pesticides and phosphates and lower slug pressure (so lower metaldehyde requirement).
- Improved plant health from better rooting, which also means improved access to water, oxygen and nutrients and an improved environment for soil organisms.

Push productivity

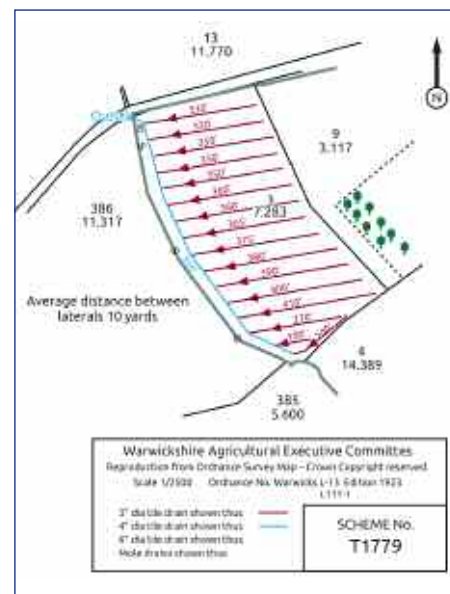
But that's not to say that a soil is naturally well drained, and farmers have developed drainage systems over centuries that have allowed them to manage the water flow and push productivity higher. "I think a lot of farmers would be surprised just how many man-made drains they'd find in their fields. Before spending any capital on new systems, one of the cheapest and easiest jobs that can be hugely beneficial is to identify just where those drains are and whether they're flowing."

It's common for an area of water-logging to be caused by a blocked outfall, that can take just a few minutes to remedy with a spade, he points out. "But often, just identifying where those outfalls are is the hard part."

Where there's a drainage plan, this is often straightforward, maintains Kirk Hill. Where one doesn't exist, the best time to look for outfalls is winter or late autumn when there's less vegetation. "It can be helpful to

walk along a ditch after rainfall as you may hear an outfall running."

If the pipe isn't visible, seepage from the bank or an area where the bank's receded can indicate where an outfall lies. "You may need to clear any vegetation, and the ditch may have become silted and blocked the pipe. But before doing any clearance work, you should consider the environmental implications — there are ways of managing ditches for drainage that also benefit invertebrates and aquatic plants."



A drainage plan can help trace outfalls and drain locations – look for the one that was signed off, which the original drainage contractor may still have.



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Research round-up

AHDB project 2180005, Best practice for drainage maintenance and renewal, ran from Sept 2014 to June 2015. Its aim was to bring together best management practice to maximise the drainage capacity of existing systems and optimise financial returns, and deliver the information through an easy-to-use

guide. The project is led by ADAS, and cost £18,350 in total, with £1540 contributed by Catchment Sensitive Farming and the rest funded by AHDB, shared across all sectors. The guide is due to be launched at Tillage Live on 16 Sept.



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Good soil management goes hand-in-hand with drainage, stresses Kirk Hill. "Too many growers spend a lot of time subsoiling but haven't sorted out the drainage. Drains rely on a good soil structure for water to permeate effectively, while if the drains aren't working properly, a soil will soon slump or compact, especially if it's been recently loosened."

For subsoiling to result in improved drainage, the foot should be able to pass through the permeable backfill — usually gravel or stone chippings — above a drain, he advises. "It's essential the bullet of a mole drain passes through the permeable fill."

While the guide will be available at Tillage



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Live, Kirk Hill recognises there's a lack of training available for those who want to learn more. "There's the BASIS Soil and Water course, but this is fairly light on drainage. Talks on soil form part of CSF, and this includes drainage. But that's only available to farmers in target catchments.

"There should be more training available, and a better grounding in drainage should be encouraged at agricultural colleges. But in recent decades, there's been little interest among farmers, so it's a subject that's been left to languish," he points out. ■

Rising input costs and flood waters prompt action in Yorks

The autumn of 2012 was a turning point for Tamara Hall, who farms 500ha at Molescroft Grange Farm north of Beverley in E Yorks. "There was one field where our barley spent pretty much all of the winter under water — it was a disaster," she recalls.

"We'd got to the point where we had to decide whether we were going to farm these fields or put them into stewardship. The blackgrass was getting worse and the cost of inputs had risen to a point where there was too much of an investment to gamble on not achieving a decent crop."

There's good potential in the predominantly clay soils with some sand and black land. But some of it lies at sea level, running down to the River Hull and seasonally floods. "The crops don't mind being flooded for a surprisingly long time, but the land remains wet and water-logged for months afterwards, and that's what holds them back."

Much of the farm has under-field drains, with some of the best systems installed in the 1980s, but Tamara Hall admits they've been neglected since. "We got the same contractor who'd installed the drains to come out — they still had the original plans."

The drains and outfalls across the 14ha field were located and inspected — initially they had

a go at trying to clear them. "We rodded and jetted them, and I was shocked at just how bad they were. The drains across about half the field had to be re-laid, but the big problem was the main outfall — it was blocked by a willow tree that had grown up."

The drains were repaired, adding in permeable backfill, at a total cost of £3400. "It's more expensive to add the gravel, but it's worth it — on our land the drains wouldn't have worked without it."

The result from that first field was "staggering", she says. "Normally it struggles to yield 8.5t/ha, but it was the highest-yielding field on the farm — the Grafton second winter wheat pulled in 12t/ha."

This has spurred her on to drain a second field — one of the worst at seasonally flooding. "They installed a one-way valve so it closes when the river swells and doesn't wash silt up the drain. The interesting thing is how well the soil dries out when the flood waters subside."

This was a larger job, and cost around £14,000. "But I think this will easily pay back in less than ten years — the current crop of Relay winter wheat looks superb."

The plan is to carry on, repair the drains in more of the problem fields and take better care of those that are now working again, says



Tamara Hall aims for a 10% return on capital and reckons drainage has definitely been one of her better investments.

Tamara Hall. "It's a considerable cost but the aim is a 10% return on capital and I think drainage achieves this on our land, so it's definitely been one of our better investments.

"It's just difficult to bite the bullet, because it's not like a new drill that you can see working. In fact, you can't even see what you've spent your money on at all, but it's very gratifying when you put the combine through," she concludes.